CLAIMS

Please cancel claims 16-18 without prejudice or disclaimer as to the subject matter thereof.

1. (currently amended) In a multi-site, cardiac pacing system for delivering ventricular pacing pulses, a method of timing the delivery of left ventricular pacing pulses from a preceding atrial event and following, in time, the depolarization of the right ventricle comprising:

establishing a left ventricular atrio-ventricular delay (A-LVp) from an atrial event (A) to time the delivery of a left ventricular pacing pulse (LVp) by:

sensing ventricular depolarizations of the left ventricle as a left ventricular sense (LVs) event;

measuring the intrinsic atrial-left ventricular delay between an atrial event and the LVs event as an intrinsic A-LVs delay;

sensing ventricular depolarizations of the right ventricle as a right ventricular sense (RVs) event;

measuring the intrinsic atrial-right ventricular delay between an atrial event and the RVs event as an intrinsic A-RVs delay; and

determining an ~~left ventricular~~ A-LVp delay that is shorter than the intrinsic A-LVs delay and longer than the intrinsic A-RVs delay;

starting an ~~timing out the~~ A-LVp delay timer from ~~each~~an atrial event (A); and

delivering a left ventricular pacing pulse to the left ventricle ~~at the~~ when the A-LVp delay timer reaches ~~time-out of~~ the determined A-LVp delay to effect fusion pacing of the left ventricle with intrinsic depolarization of the right ventricle.

2. (currently amended) The method of Claim 1, wherein the determining step further comprises setting the determined A-LVp delay to be shorter than the intrinsic A-LVs delay by a programmable factor.

3. (Original) The method of Claim 2, further comprising:
comparing the determined A-LVp delay with the intrinsic A-RVs delay;
if the determined A-LVp delay is shorter than the intrinsic A-RVs delay, then determining a right ventricular A-RVp delay that is shorter than the intrinsic A-RVs delay and the determined A-LVp; and
timing out the A-RVp delay from the atrial event and delivering a right ventricular pacing pulse to the right ventricle at the time-out of the A-RVp delay to effect bi-ventricular pacing of the right ventricle and the left ventricle.

4. (Original) The method of Claim 2, further comprising:
comparing the determined A-LVp delay with the intrinsic A-RVs delay;
if the determined A-LVp delay is longer than the intrinsic A-RVs delay, then determining a right ventricular A-RVp delay that is longer than the intrinsic A-RVs delay.

5. (Original) The method of Claim 4, further comprising:
comparing the determined A-LVp delay with the intrinsic A-RVs delay;
if the determined A-LVp delay is shorter than the intrinsic A-RVs delay, then determining a right ventricular A-RVp delay that is shorter than the intrinsic A-RVs delay and the determined A-LVp; and
timing out the A-RVp delay from the atrial event and delivering a right ventricular pacing pulse to the right ventricle at the time-out of the A-RVp delay to effect bi-ventricular pacing of the right ventricle and the left ventricle.

6. (Original) The method of Claim 1, further comprising:
comparing the determined A-LVp delay with the intrinsic A-RVs delay;

if the determined A-LVp delay is shorter than the intrinsic A-RVs delay, then determining a right ventricular A-RVp delay that is shorter than the intrinsic A-RVs delay and the determined A-LVp; and

timing out the A-RVp delay from the atrial event and delivering a right ventricular pacing pulse to the right ventricle at the time-out of the A-RVp delay to effect bi-ventricular pacing of the right ventricle and the left ventricle.

7. (Original) The method of Claim 1, further comprising:

monitoring a rate control parameter indicative of the patient's physiological demand for cardiac output; and

adjusting the determined A-LVp delay to reflect the monitored rate control parameter.

8. (Original) The method of Claim 7, wherein the adjusting step further comprises:

decreasing the A-LVp delay when the monitored rate control parameter signifies an increased demand for cardiac output; and

increasing the A-LVp delay when the monitored rate control parameter signifies an decreased demand for cardiac output.

9. (Original) The method of Claim 1, further comprising:

monitoring the intrinsic atrial rate of the patient's heart; and

adjusting the determined A-LVp to reflect the monitored atrial rate.

10. (Original) The method of Claim 9, wherein the adjusting step further comprises:

decreasing the A-LVp delay when the monitored intrinsic atrial rate shortens; and

increasing the A-LVp delay when the monitored intrinsic atrial rate lengthens.

11. (Original) The method of Claim 1, further comprising:
sensing any intrinsic LVs event during time-out of the A-LVp delay; and
decreasing the A-LVp delay in response to a sensed intrinsic LVs event.

12. (Original) The method of Claim 1, further comprising:
sensing any intrinsic RVs event during time-out of the A-RVp delay; and
decreasing the A-RVp delay in response to a sensed intrinsic RVs event.

13. (Original) A multi-site, cardiac pacing system for delivering ventricular pacing pulses to a left ventricular site of the heart synchronously timed from a preceding atrial event and following, in time, the depolarization of the right ventricle comprising:

left ventricular sense means for sensing ventricular depolarizations of the left ventricle as a left ventricular sense (LVs) event;

means for measuring the intrinsic atrial-left ventricular delay between an atrial event and the LVs event as an intrinsic A-LVs delay;

right ventricular sense means for sensing ventricular depolarizations of the right ventricle as a right ventricular sense (RVs) event;

means for measuring the intrinsic atrial-right ventricular delay between an atrial event and the RVs event as an intrinsic A-RVs delay;

means for determining a left ventricular A-LVp delay that is shorter than the intrinsic A-LVs delay and longer than the intrinsic A-RVs delay;

means for timing out the A-LVp delay from the atrial event; and

means for delivering a left ventricular pacing pulse to the left ventricle at the time-out of the A-LVp delay to effect fusion pacing of the left ventricle with intrinsic depolarization of the right ventricle.

14. (Original) The system of Claim 13, wherein the determining means comprises

means for setting the A-LVp delay to be shorter than the intrinsic A-LVs delay by a programmable factor.

15. (currently amended) The system of Claim 14, wherein ~~:~~ the determining means further comprises:

means for comparing the determined A-LVp delay with the intrinsic A-RVs delay; and

means for determining a right ventricular A-RVp delay that is shorter than the intrinsic A-RVs delay and the determined A-LVp in the event that ~~if~~ the determined A-LVp delay is shorter than the intrinsic A-RVs delay; and further comprising:

means for timing out the determined right ventricular A-RVp delay from the atrial event and delivering a right ventricular pacing pulse to the right ventricle at the time-out of the determined right ventricular A-RVp delay to effect bi-ventricular pacing of the right ventricle and the left ventricle.

16.-18. (canceled)

19. (Original) The system of Claim 13, further comprising:

means for monitoring a rate control parameter indicative of the patient's physiological demand for cardiac output; and

means for adjusting the determined A-LVp delay to reflect the monitored rate control parameter.

20. (Original) The system of Claim 19, wherein the adjusting means further comprises:

means for decreasing the A-LVp delay when the monitored rate control parameter signifies an increased demand for cardiac output; and

increasing the A-LVp delay when the monitored rate control parameter signifies an decreased demand for cardiac output.

21. (Original) The system of Claim 13, further comprising:

means for monitoring the intrinsic atrial rate of the patient's heart; and

means for adjusting the determined A-LVp to reflect the monitored atrial rate.

22. (Original) The system of Claim 21, wherein the adjusting means further comprises:

means for decreasing the A-LVp delay when the monitored intrinsic atrial rate shortens; and

means for increasing the A-LVp delay when the monitored intrinsic atrial rate lengthens.

23. (Original) The system of Claim 13, further comprising:

means for sensing any intrinsic LVs event during time-out of the A-LVp delay; and

means for decreasing the A-LVp delay in response to a sensed intrinsic LVs event.

24. (Original) The system of Claim 13, further comprising:

means for sensing any intrinsic RVs event during time-out of the A-RVp delay; and

means for decreasing the A-RVp delay in response to a sensed intrinsic RVs event.

25. (Original) In a multi-site, cardiac pacing system for delivering ventricular pacing pulses to at least one of the right and left ventricles of the heart (V1), a method of timing the delivery of the ventricular pacing pulse from a preceding atrial event and following, in time, the depolarization of the other of the right and left ventricles (V2) comprising:

establishing an atrio-ventricular delay (A-V1p) from an atrial event (A) to time the delivery of a ventricular pacing pulse (V1p) to ventricle V1 by:

sensing ventricular depolarizations of ventricle V1 as a ventricular sense (V1s) event;

measuring the intrinsic atrial- ventricular delay between an atrial event and the V1s event as an intrinsic A-V1s delay;

sensing ventricular depolarizations of the ventricle V2 as a ventricular sense (V2s) event;

measuring the intrinsic atrial-ventricular delay between an atrial event and the V2s event as an intrinsic A-V2s delay; and

determining an atrio-ventricular A-V1p delay that is shorter than the intrinsic A-V1s delay and longer than the intrinsic A-V2s delay;

timing out the A-V1p delay from each atrial event; and

delivering ventricular pacing pulse V1p to the ventricle V1 at the time-out of the A-V1p delay to effect fusion pacing of the ventricle V1 with intrinsic depolarization of the ventricle V2.

26. (Original) The method of Claim 25, wherein the ventricle V1 comprises the right ventricle and the ventricle V2 comprises the left ventricle.

27. (Original) The method of Claim 25, wherein the ventricle V1 comprises the left ventricle and the ventricle V2 comprises the right ventricle.

28. (Original) A cardiac pacing system for delivering ventricular pacing pulses to at least one of the right and left ventricles of the heart (V1) timed from a

preceding atrial event and following, in time, the depolarization of the other of the right and left ventricles (V2) comprising:

means for establishing an atrio-ventricular delay (A-V1p) from an atrial event (A) to time the delivery of a ventricular pacing pulse (V1p) to ventricle V1 by:

sensing ventricular depolarizations of ventricle V1 as a ventricular sense (V1s) event;

measuring the intrinsic atrial- ventricular delay between an atrial event and the V1s event as an intrinsic A-V1s delay;

sensing ventricular depolarizations of the ventricle V2 as a ventricular sense (V2s) event;

measuring the intrinsic atrial-ventricular delay between an atrial event and the V2s event as an intrinsic A-V2s delay; and

determining an atrio-ventricular A-V1p delay that is shorter than the intrinsic A-V1s delay and longer than the intrinsic A-V2s delay;

means for timing out the A-V1p delay from each atrial event; and

means for delivering ventricular pacing pulse V1p to the ventricle V1 at the time-out of the A-V1p delay to effect fusion pacing of the ventricle V1 with intrinsic depolarization of the ventricle V2.

29. (Original) The system of Claim 28, wherein the ventricle V1 comprises the right ventricle and the ventricle V2 comprises the left ventricle.

30. (Original) The system of Claim 28, wherein the ventricle V1 comprises the left ventricle and the ventricle V2 comprises the right ventricle.